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Explorations into Religiosity and its Implications on Physiological Health, Self-Esteem & Life Satisfaction

Fadi Edwar Hakeem
University of Tennessee, fhakeem@vols.utk.edu

To the Graduate Council:

I am submitting herewith a thesis written by Fadi Edwar Hakeem entitled "Explorations into Religiosity and its Implications on Physiological Health, Self-Esteem & Life Satisfaction." I have examined the final electronic copy of this thesis for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Master of Arts, with a major in Psychology.

Debora Baldwin, Major Professor

We have read this thesis and recommend its acceptance:

Michael Olson, Ben Allen

Accepted for the Council:
Dixie L. Thompson

Vice Provost and Dean of the Graduate School

(Original signatures are on file with official student records.)

Explorations into Religiosity and its Implications on Physiological Health, Self-Esteem & Life Satisfaction

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Fadi Edwar Hakeem

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Abstract

In the current study, I examined the association of religiosity on the psychological and physiological health of individuals. I administered a survey to determine the religious levels of the participants along with two surveys that inquired about self-esteem and life satisfaction. Two physiological measures were utilized to aid the findings of the self-report measures. These included heart rate variability and salivary cortisol. Heart rate variability measures included heart rate mean, high frequency power and standard deviation normal to normal (SDNN). My primary hypothesis was that higher religiosity levels would positively impact self-esteem, life satisfaction, heart rate variability and cortisol levels. Results revealed no significance between religiosity and heart rate mean. We found no correlation between religiosity and standard deviation normal-to-normal. We found a negative significant correlation between religiosity and high frequency. With regard to salivary cortisol, analysis did not find any significance between religiosity and cortisol levels. Analysis revealed no significance between religiosity and self-esteem or life satisfaction. A positive significant correlation was found between higher self-esteem and higher life satisfaction. I also hypothesized that religious males would report higher scores on the self-report measures and that they would report healthier physiological results, compared to religious females. No significance was found concerning most measure when a T-test analysis and regression analysis was used to compare gender. Males did reveal higher satisfaction with life than females. To summarize, this study did not support our hypotheses on almost every measure, but did show males report better life satisfaction than females.

Table of Contents

List of Tables

List of Figures

Chapter I
Introduction

Religion and spirituality are a powerful source of optimism and hope for many people. Individuals across the world consider religion as a fundamental part of their life experience. People shape their beliefs, their goals and their hopes according to their religion. Ever since human beings began recording history we see religion, spirituality, ritualism, a search for the divine and a hunger for purpose. We have seen deities rise and fall, and gods that were once worshiped as almighty are now taught in college classes as mythological. Religion is hailed and praised for the many goods that it has produced, but also criticized, scrutinized and hated for the many evils that we have witnessed in the world in the name of religion. This necessarily raises the question: Does religion benefit or cause detriment to individuals? The results are mixed but research shows that studies in religion show positive, beneficial associations more than they show negative ones (Koenig, 2012). A study conducted in England to see how religion and spirituality impact mental health found that religious and non-religious people had similar levels of mental illness, but that the religious were less likely to use drugs or be heavy drinkers. (King, Marston, McManus and Brugha, 2013). And while religion and spirituality have common ground, studies show that they can have different implications. Research shows that individuals who participate in religious life frequently show higher life satisfaction and exhibit lesser symptoms of anxiety and depression than those who are spiritual (Edling, Rydgren & Bohman, 2014).

Religiosity and spirituality have been considered synonymous. The reason for this is because the two descriptions share some similarities. Studies consider the common themes

among the two, but they also point out the important distinctions. Religion can encompass spirituality because of belief in a higher power but spirituality is more concerned with the meaning of one's own life. Religion focuses more on social support, denomination and belief systems (Mandhouj, Aubin, Amirouche, Perroud & Huguelet, 2013). Religion can be defined as a belief system that is agreed upon by a group of believers who practice the same traditions. Spirituality is more about seeking a connection with sacred concepts or higher powers (Worthington, Hook, Davis & McDaniel, 2011).

While the terms "religious" and "spiritual" are many times used interchangeably in society, scholars recognize their distinctions. These concepts have been used to evaluate the relationship between people who believe in a god and how it impacts their health. We see throughout the literature that religiosity is beneficial in some cases, but also shows negative effects in other cases. We will examine these findings further.

It is very common for researchers to consider gender differences in their samples, but I was especially interested in doing so here because men and women have very different roles in multiple religions, which in turn can affect them distinctively. Where women desire freedom to preach, men may desire to keep them under male authority and submission. A paper written on the role of Baptist women in the mid 1900's mentioned a male Baptist preacher who said that women who desire to be preachers are at the heart of all sin and rebellious against authority (Early Jr., 2018). Far too often women in the past and until today, have accused the church of sexism. And with words like that of the male Baptist preacher there are religious women who feel degraded and inferior. Even when a male minister may decide to ordain women into the ministry, he may face strong backlash. A preacher in the 1980's ordained three female deacons in Johnson City, Tennessee. The

following Sunday he arrived at church to find out that he had been relieved of his duties and that his congregation no longer wanted him (Dyson, 2003). This shows the strength of opposition against women in the church, even when their male counterparts support them. We also know that suppression of women's voices in the Catholic Church can lead to anxiety and even affect the intellectual development of young females (Coblentz & Jabobs, 2018). Due to this historical oppression of women found across religions of different backgrounds, I predicted that religious males would show healthier cardiovascular and stress responses, as well as higher self-esteem and higher life satisfaction when compared to religious females.

According to Koenig (2012), no study in the MEDLINE database contains the three words "resilience, religion and cortisol." This outlines the dire need for researchers to dive in to the psychology of religion combining self-report measures with physiological measures. So I decided to measure the cortisol levels of participants and seek to find a relationship between high religiosity and healthier stress responses. While self-report measures can provide incredible insight and help us understand the relationships between certain variables, the supplement of physiological measures to psychological studies aids the findings tremendously.

The goal of this study was to consider religious and spiritual people, and how their religiosity affects their life satisfaction and self-image. I also sought to determine if religiosity had a significant relationship with the physiological measures that I measured. These measures included salivary cortisol and heart rate variability. I did this so that I was not only evaluating the questions that people answered. I was seeking to determine if the participants' bodies are corresponding with what they were self-reporting. And while there

are studies that show a positive association between religion and mental health, very few studies examine the relationship between religion and physiological measures, especially salivary cortisol.

Literature Review

Overall Benefits of Religion

According to Aldwin (2014), religion or spirituality tend to affect overall health via behavioral self-regulation and emotional self-regulation. The model suggests that the social impact of religion helps individuals lead a lifestyle of healthier habits which is considered behavioral self-regulation. Researchers attribute this to the psychosocial impacts of attending church services and church membership. As for spirituality, they theorize that this impacts physiological health. They suggest that feeling close to a transcendent power effects the hypothalamic-pituitary-adrenal and sympathetic adrenal medullary axes, calling this emotional self-regulation. So the more connected to transcendence one may feel, the more likely they are to have positive emotions.

Feeling hopeful about life can affect overall well-being. A study conducted on how religion impacts hope found that there was a negative correlation between hope and anxiety, only in the presence of religion or spirituality (Dipierro, FIte & Johnson-Motoyama, 2017). In other words, hopeful people who are religious experience less anxiety than those who are hopeful and non-religious. As for physical health, many studies on the health benefits of religion show greater life expectancy, less heart disease, lower cancer rates and higher rates of survival among cancer patients (Koenig & King, 2012). In these findings, Koenig (2012) mentions that the positive association between religion and good health

outweighs that of religion and negative health, though the studies that show religion can be detrimental still make up a significant portion.

Religious participants have also been shown to have associations with lower levels of blood pressure and a stronger immune system (Assari, Lankarani, Malekahmadi, Caldwell and Zimmerman, 2015). A meta-analysis that examined 101 samples that combined a total of 32,000 cancer patients found that cancer patients who had religious or spiritual practices self-reported better physical health (Jim, Pustejovsky, Park, Danhauer, Sherman, Fitchett & Salsman, 2015). These studies give an idea of the kinds of questions that researchers are asking. They also give a general view of how religion may have a positive effect on an individual's mindset as well their physical health.

Gender and Religion

For a long time, women have fought in both politics and religion for a leveled playing field. One of the main issues is that many of the religions that religious women follow tend to side with the men in their sacred texts, or at least that is one interpretation. The way some people see it is that religions like Christianity and Islam were among the first feminist groups, providing rights and dignity to their women followers (Duderija, 2017). Essentially, it is an argument of patriarchy versus non-patriarchy. With these two ideas clashing over the centuries, religion has served as both an oppressor and liberator of women. A group of sociological scholars are now calling for "religious citizenship." A term that describes having the same rights in your religion as you have in your country. It claims that religion must give rights based on a sense of belonging and dignity, not gender (Nyhagen, 2014). This study asked Christian women and Muslim women in Norway and the United Kingdom on their view of society and religion. Some of the women made a strong

distinction between religion and citizenship, which shows a disconnect between a part of the sample and what the researchers are aiming for. Muslim women were more likely to consider the gender differences in their religion as less problematic, while Christian women were more likely to view it as a problem. A study showed that Hindu religions which were more equal eventually became patriarchal because of colonization (Dobia, 2013). This shows a cultural issue is in play. Studies show that in cultures men are clearly more authoritative over women, that same mindset is projected on to religion and worship (Swatos, 1994). To put this all together, we must clearly understand the issue. Women are being taught to be free by some and be suppressed by others. They attend churches and mosques that make them feel confused about their place in the community and their value to the religious organization. Considering how much religion factors into many peoples' lives I predicted that religious women would suffer the consequences from this constant opposition. It is safe to say that religion has caused women's oppression on a global scale, considering its long history. In several cases, women cannot be who they want to be, dress how they would like to dress or pray how they would like to pray. For these reasons I consider men to be much more favored and in turn have more to gain from religious practice than their female counterparts.

Heart Rate Variability and Religion

Heart Rate Variability (HRV) constitutes variation in the time interval between heartbeats (Thayer, Ahs, Fredrikson, Sollers & Wager, 2012). We measured the standard deviation of the normal to normal (SDNN), which considers the time (in milliseconds) between the peaks of the heartbeats. Higher SDNN shows that the heart is having longer periods of rest between peaking again. We also measured high frequency which is linked to

the parasympathetic nervous system. Higher high frequency shows that the individual has a better calming response after a stressful event. Short-term readings, considered to be between five and fifteen minutes, can explain physiological changes in the autonomic nervous system (Kleiger, Stein and Bigger, 2005). In this study we measured a five minute reading of heart rate variability which shows heart activity during a 24-hour cycle. Since heart rate variability is an indicator of cardiovascular health, researchers have utilized this measure in their questions on religion. A study conducted on the impact of short-term yoga practice on heart rate variability found that just one month of practicing yoga positively impacted the parasympathetic nervous system of the participants (Vinay, Venkatesh and Ambarish, 2016). Another study examined a group of elderly individuals when attending chaplain liturgy, in which they listened to a 30-minute sermon every week. The study found that those who attended chaplain liturgy displayed significantly higher high frequency than those who did not attend (Kurita, Takase, Shinagawa, Kodani, Okaa, Iwahara and Atarashi, 2011). In a study that evaluated an older population on their spirituality (mainly closeness and relationship with God), they found similar results. Older individuals who had higher spirituality displayed higher parasympathetic dominance (high frequency) (Berntson, Norman, Hawkley & Cacioppo, 2008). It is possible that even participating in a religious, minimally engaging service such as listening to a sermon can positively impact physical health. Another study examined heart rate variability and asked a group of women to perform a 23-minute session of cyclic meditation. The study reported results of parasympathetic dominance in these women after meditation (Kulkarni, Nagarathna, Nagendra & An, 2010). Besides the religious aspect of meditation, these readings may also be the result of slower breathing. The relativity of yoga to religiosity may not be the

strongest, but yoga is considered a spiritual practice. These yoga studies are also among the larger body of work when it comes to religiosity, spirituality and heart rate variability, which shows there is an immense need for further research in this area.

Cortisol and Religion

Cortisol is a stress hormone that can be measured from urine, blood and saliva. It is a biomarker of how the body responds to physical and psychological pressure. It is well known for being a stress mechanism but it serves many other functions including regulation of blood pressure, increasing blood sugar and is therefore very relevant to a person's health (Dedovic and Duchesne, 2012). The literature on the issue of religion and its impact on cortisol levels is not extensive but we will present here some of the studies that have been conducted and their findings. A study was done on religiosity in women with fibromyalgia to see if religion helped their cortisol rhythm. They found that women who reported moderate to high religious levels had a healthy cortisol rhythm, meaning their cortisol levels peaked in the morning and decreased towards the evening, while the women who were less religious reported more flattened cortisol levels (Dedert, Studts, Weissbecker, Salmon, Banis and Sephton, 2004).

Having a flattened cortisol rhythm does not allow your body the proper cortisol awakening response (CAR) which results in being less physically and mentally able to take on the day (Arbel, Shapiro, Timmons, Moss and Margolin, 2017). Research has shown that African-Americans are more vulnerable to high cortisol levels than whites. A study wanted to investigate further and explore cortisol levels with regard to religiosity in male and female African-American youth. This is important in context since we evaluated differences between religious males and religious females with regard to cortisol levels. Researchers

found that religious involvement was negatively associated with mean cortisol levels in males but not in females (Assari, Lankarani, Malekahmadi, Caldwell and Zimmerman, 2015). A study looking at how religious coping mechanisms impact cortisol found healthier cortisol slopes after a 10-year follow-up (Tobin & Slatcher, 2016). Another study examining religiosity, forgiveness, and how often people prayed found lower cortisol levels in those who were more religious (Tartaro, Luecken and Gunn, 2005). What this research suggests is that people who are attending religious services and indulging in religious practices sometimes show healthier stress responses than those who are not religious. The studies listed are the only studies that I found that were related cortisol and religion, which highlights the lack of research in this area.

Mental Health and Religion

There is a large body of research on religiosity and mental health. It's important to note that most of the studies done on religion and mental health involve only self-report measures (Krause, Ironson and Hill, 2016). Self-report measures have helped researchers make some very strong correlations, but physiological results are sometimes needed to supplement what people are self-reporting so that we may have a better understanding of the correspondence between people's physical health and their mental perceptions.

Death is a reality for us all. Constantly worrying about it or fearing it greatly can take a toll on an individual's mind. A study that evaluated the fear of death among the religious and the non-religious found that people who were religious feared death more than the non-religious (Ellis, Wahab & Ratnasingan, 2013). I considered this a very important study. One of the main talking points used on religious people is that they worship a god only because there is promise of immortality. And this study shows that

perhaps there are some who are seeking religion thinking that they are promised eternal life. While religion should comfort them since they have a belief of immortality, it may in fact be doing the opposite.

A study done on mental health in religious Israeli Jews found that those who received religious childhood education were associated with more depression and less life satisfaction. It also showed that an individual's current level of prayer was associated with lower quality of life and higher levels of depression (Levin, 2012). A study conducted on a geriatric population examined religiosity, depression and overall mental health. The researchers reported that those who had higher religiosity showed better collective mental health, lower levels of depression and a stronger will to live (Wozniak, Zawisza & Tobiasz-Adamczyk, 2011). We see from this research that religion can affect mental health both positively and negatively. According to Koenig (2012), religion is a positive force for mental health more than it is a negative force, throughout the literature. Religion can make people more kind, compassionate, charitable and forgiving. But it can also make them intolerant, fearful, competitive and mean-spirited. The studies seem to show that some are reaping the benefits of religion while others experience its more bitter side. A study that explored the association between religiosity and depression in intercollegiate athletes found that religious athletes were 20% less likely to show symptoms of depression (Storch, Storch, Welsh and Okun, 2002).

Self-Esteem and Life Satisfaction

With regard to religiosity and self-esteem, the results are mixed, which leaves us more open for its psychological outcomes. There are multiple studies that show both high self-esteem and low self-esteem correlated with being religious (Top, Chadwick,

McClendon, 2003). But here I will present some of the studies that contributed to my hypothesis, in which I predicted to find that religion benefits these measures. A cross-cultural study that analyzed data from 187,957 individuals found that people who were more religious had higher self-esteem (Gebauer, Sedikides and Neberich, 2012).

A study on the impact of social support and religious life showed that those who prayed more and attended church more had higher self-esteem and lower levels of depression (Sherkat & Reed, 1991). A researcher wanted to examine the role of the church and its impact on life satisfaction in the African-American community. He found that elderly African-Americans who attended church services more frequently reported higher life satisfaction (Krause, 2004). This was attributed this to the fundamental role of the church becoming a social support for many African-Americans during the Civil Rights Movement. Similarly, another study wanted to answer the question of why religious involvement results in life satisfaction a modest majority of the time. Researchers concluded that the strongest contributor to life satisfaction was social networking and friendships built through church attendance (Lim & Putnam, 2010).

Purpose of Study

Over the last several years, research interest has significantly increased in trying to find the relationship between religiosity and mental health, including measures of well-being and life satisfaction (Abdel-Khalek, 2011). We are seeking to understand even further how influential religiosity can be for life satisfaction and self-esteem. Self-esteem is interesting because the individual may ward off depressive symptoms when viewing themselves highly in terms of self-worth. We measured life satisfaction to see if religiosity does positively influence a person's contentment with life. Also, I looked for an association

between religion and these specific measures since scholars claim that the results are mixed, attempting to contribute to this body of knowledge and help close the gap.

I evaluated gender differences for several reasons. As I mentioned, the history of oppression towards women in religion exists till this day. And while it impacted women negatively back then, it also negatively impacts them now especially in the changing dynamic and the fight for egalitarianism. Women in religion are being marginalized and they fight battles on many fronts. Then these same women go to church where they are told in many cases, that they cannot exercise the same rituals or do not hold the same authority as the men do. I considered that this treatment of religious women may possibly make them feel inferior and less favorable in the eyes of their religion. Men, in many religions, are considered stewards of their god, having the authority to oversee and control a church or a mosque. For these reasons, I sought to find differences between religious men and women, predicting that the men would be mentally and physically better off, since religion in most cases caters to them. I did not find but one study listed above that compared religious males to religious females, in which they found men had lower blood pressure than women (Tartaro, Luecken and Gunn, 2005).

The purpose of heart rate variability was to contribute to the limited amount of literature that has considered religion and cardiovascular health. The same goes for salivary cortisol, where the literature concerning this measure with regard to religiosity is overwhelmingly narrow. If religion makes people happier, more optimistic and less worried, then stress levels measure through cortisol should in some way reflect that. One of the main reasons for this research was to contribute some sort of finding to this very

restricted area of research. Collectively, this study aimed to solidify previous research, add onto very limited research and to advance scientific inquiry.

Hypotheses

Hypothesis 1: Participants who report higher religiosity scores will report higher scores on the self-esteem and life satisfaction measures.

Hypothesis 2: Participants who report higher religiosity scores will report healthier cortisol levels (lower scores in between .3 and 3.0 mg/dl) and healthier heart rate variability (higher SDNN, higher high frequency and lower heart rate mean.)

Hypothesis 3: Males who report high religiosity levels will report higher scores on the self-esteem and life satisfaction measures than females who report high religiosity.

Hypothesis 4: Males who report high religiosity levels will report healthier cortisol levels as well as healthier heart rate variability.

Chapter II
Methods

Participants

One hundred and six participants (39 males and 67 females) were recruited from the University of Tennessee- Knoxville. Participants were recruited through an online portal from the psychology department via SONA and also through word of mouth. Students who agreed to participate were rewarded with extra credit in their psychology courses. All participants were at least 18 years of age and there were no other exclusion factors. The majority of participants were Euro-American (70.8%) and this study was approved by the university review board. All participants were asked to sign consent forms before beginning the study.

Self-Report Measures

Demographic Questionnaire: A self-report questionnaire was given to acquire information from each participant on their race, gender, academic classification, religious affiliation and other information.

Centrality of Religiosity Scale: The Centrality of Religiosity Scale is composed of 15 items that ask about religious life, religious practice and spirituality. The scoring for each item is between 1 and 5, then the sum score is divided by the number of scored items. The researchers seek to ask questions that evaluate five dimensions: the intellectual, the ideological, the ritualistic, the experiential and the consequential (Huber & Huber, 2012). They include 3 questions for each dimension for a total of 15 questions. These five concepts are written into the questions. Evaluating what people believe, to what extent do they believe it, how often they practice, what it means for their life, etc. The flexibility of this

scale is impressive and it seemed to encompass all sorts of beliefs and practices, which would give people more freedom to identify how they truly felt. Cronbach's alpha reliability test revealed a score of .784.

Rosenberg Self-Esteem Scale: The Rosenberg Self-Esteem Scale is a popular and highly utilized scale in the field of psychology. The scale is composed of 10 items in which participants choose 1 of 4 answers to every statement. These answers include Strongly Agree, Agree, Disagree and Strongly Disagree. Items 2,5,6,8,9 are reverse scored. The summed-up score can range between 0-30. A lower indicates lower self-esteem, and a higher score indicates higher self-esteem (Rosenberg, 1965). Cronbach's alpha reliability test revealed a score of .870.

Satisfaction with Life Scale: The Satisfaction with Life Scale is a widely used measurement for determining life satisfaction. The scale is composed of 5 statements in which the responder answers within a range of 1 to 7. (Diener, Emmons, Larsen & Griffin, 1985). Cronbach's alpha reliability test revealed a score of .781.

Sample Size

I conducted a power analysis using a g*power sample calculator to determine a proper sample size for this study. The power was at .80 and alpha was .05. Effect size was set to .25 with a 95% confidence interval, which arrived at a sample of 120.

Physiological Measures

Salivary Cortisol: Cortisol was obtained from saliva samples. We collected salivary data through the pool-and-drool technique. We asked participants to salivate into a 50 ml test tube for a baseline measure. Cortisol levels were analyzed with an assay kit from Salimetrics. Samples were spun using a centrifuge and were put into 1.5 ml microtubes.

They were then stored in an ultra-freezer (-80 degrees) for subsequent analysis. Lower cortisol levels indicate less stress and higher cortisol levels indicate more stress.

Heart Rate Variability: Heart Rate Variability (HRV) was measured using a multichannel Procomp InfinitiTM and Biograph software system (Thought Technology Ltd., Montreal Canada). The sensors were connected to an 8-channel encoder and data was sent to a file. We measured Heart Rate Mean, High Frequency Power (measured in the range of .15 Hz and .40 Hz) and the standard deviation of normal-to-normal (SDNN). These measurements were taken by 3-lead electrode sensors positioned on the forearm and wrists of the individual. All data were automatically filtered and corrected for artifacts (i.e., muscle contractions, electrical noise, missed beats, extra beats and polarity. SDNN was log transformed to ensure normality. High frequency was not normalized.

Procedure

Upon reporting to the testing laboratory, participants were administered an informed consent form indicating their willingness to participate fully in this study. After consent, the participants completed three questionnaires (i.e., Centrality of Religiosity Scale, the Rosenberg Self-Esteem Scale and the Satisfaction with Life Scale) via computer located in the laboratory interview room. Upon completion of the questionnaires, participants were escorted to the experimental room where physiological measures were taken. First, we collected a saliva sample. We asked participants to rinse their mouth with water prior to the collection of saliva. Then they were asked to sit quietly and let the saliva pool in their mouth for one minute. At the end of the minute they were asked to expectorate into a sanitized 50 ml test tube. They repeated this procedure for two more times for a total of a three-minute saliva sample collection. All samples were stored in an ultra-freezer until they

were later analyzed. Secondly, we asked participants to sit quietly for 5 minutes while baseline measures of HR and HRV were taken. Heart rate variability was measured using a sensor that was attached to the participants' forearms, and a computer program recorded the measure.

After all measures were taken, the participant was thanked. The total time for data collection was between 20-25 minutes.

Chapter III
Results

All of the results of the physiological measures and the surveys were recorded and placed in a data file. All of the data were analyzed using SPSS version 23 (SPSS, NY, USA). The following analysis were performed: Independent T-test and Pearson's Correlations. .05 was the alpha level set for every analysis. See Appendix for all tables and figures. Table 1 represents the means and standard deviations for all study variables.

Analysis of Self-Report Measures (Hypothesis #1):

The study did not evaluate enough non-religious people as we had hoped for to make a comparison between religious and non-religious individuals with regard to self-report measures. The majority of participants in this samples consider themselves religious. Of all participants (*N*=106) only 12 individuals reported having no religious identity. On a scale of 1 to 5, 1-2 being not religious, 2.1- 3.9 being religious, and 4- 5 being highly religious, the Centrality of Religiosity Scale showed a "religious" presence among participants (*M*=3.19, SD= .511). I ran a correlational test between religiosity and every other measure (see Table 2). When testing for the relationship between religiosity and life satisfaction, the Pearson correlation showed no significance (r=-.116, *p*=.263). Additionally, the Pearson correlation showed no significance between religiosity and self-esteem (r=.009, *p*=.929) But a test of correlations did reveal a positive significance between life satisfaction and self-esteem, (r=.509, *p*=.000). Though for our hypothesis we reject the null hypothesis.

Analysis of Physiological Measures (Hypothesis #2):

Salivary Cortisol: Tests of correlation were performed for religiosity and cortisol levels (see Table 2). The analysis revealed no significance between being religious and having healthier cortisol levels (r=-.081, *p*=.409). *Heart Rate Variability*: Tests of correlation were also performed between religiosity and heart rate variability. Heart rate variability tests accounted for Standard Deviation Normal-to-Normal (SDNN), and High Frequency Total Power Mean (HFTPM). Analysis revealed no significance between religiosity and HRMean, (r=-.087, *p*=.373). A Pearson's Correlational analysis revealed no significance between religiosity and SDNN (r=.007, *p*=.944*).* However, there was a negative significant relationship between religiosity and high frequency (r=-.309, *p=*.001*).*

In addition, a regression analysis was computed on religion and high frequency variables. Regression analysis for high frequency did reveal significance F (1, 105) =10.96, p=.001 (adjusted r^2 =.087).

Comparing Gender Groups for Self-Report Measures (Hypothesis #3):

To test this hypothesis, a regression analysis was performed using gender as a predictor to determine if there were gender differences across the self-report variables. We performed a regression looking for the main effects of religion and gender as predictors as well the interaction between them. For gender and self-esteem we found no significance, (β=.052, t=.526, p=.600. For religion and self-esteem we found no significance, (β=.005, t=.051, p=.959). For the interaction between religion and gender and self-esteem we found no significance, (β=-.388, t=-.687, p=.494). Testing for the main effects of gender and life satisfaction, we did find significance (β=-.262, t=-2.76, p=.007). Religion and life satisfaction showed no significance (β=-.097, t=-1.02, p=.306). The interaction between

religion and gender for life satisfaction found no significance, (β=.490, t=-.906, p=.367). An Independent Samples Test was performed comparing Males and Females with regard to self-report measures (see Table 4). Analysis revealed significance for life satisfaction, t (104) = 2.84, p=.005. Analysis revealed no significance for self-esteem, t (104) = -.533, p=.595.

Comparing Gender Groups for Physiological Measures (Hypothesis #4):

To test this hypothesis, a regression analysis was performed using gender and religion, their main effects and interactions as predictors to determine if there were gender differences across the physiological variables. No significance was found for religion and cortisol (β=-.079, t=-.801, p=.425). No significance was found for gender and cortisol (β=-.031, t=-.315, p=.753). For the interaction, no significance was found (β=-.092, t=-.163, p=.871). For heart rate and religion there was no significance (β=-.094, t=-.960, p=.339). For heart rate and gender there was no significance (β=.093, t=.951, p= .344). For the interaction and heart rate there was no significance (β=-.446, t=-.797, p=.427). For high frequency and gender there was no significance (β=.042, t= .447, p= .656). For high frequency and religion, we found significance (β= -.312, t= -3.32, p=.001). For the interaction we found no significance (β=.984, t= 1.85, p=.066).

For the main effects of gender as a predictor of SDNN we found significance (β=.203, t=2.10, p=.038). For religion and SDNN we found no significance (β=-.008, t=-.080, p=.937). For the interaction and SDNN we found no significance (β=.791, t=1.44, p=.153). An independent t-test was performed comparing Males and Females with regard to physiological measures (see Table 4). T-test analysis revealed no significance in any measure: Salivary Cortisol, t (104) = .374, p=.709. Heart Rate Mean, t (104) =-.885, p=.378.

High Frequency, t (104) = .201 p=.841. Standard Deviation Normal-to-Normal did reveal significance, t (104) = -2.11, p=.037.

Chapter IV
Discussion

The primary purpose of this study was to examine the relationship of religiosity with psychological and physiological health. I evaluated individuals through different measures, seeking to determine how religious they were and how their religiosity correlated with the rest of the measures.

For my first my first hypothesis, I predicted that higher levels of religiosity would result in higher self-esteem and higher life satisfaction. With regard to these two measures, analysis did not reveal any significance between religiosity and self-esteem, or between religiosity and life satisfaction. The hypotheses were formed based on an expectation supported by multiple studies. For example, a study on the impact of social support and religious life showed that those who prayed more and attended church more had higher self-esteem and lower levels of depression (Sherkat & Reed, 1991). A study that investigated religious involvement and life satisfaction in Germany showed that attending church services had strong, positive effects on life satisfaction (Sinnewe, Kortt & Dollery, 2014).

Other studies show that religion is not beneficial to individuals in many cases. A study that explored religion and self-esteem with regard to mortality showed that those who had higher religiosity showed decreased self-esteem when surveyed about death (Arrowood, Coleman, Swanson, Hood & Cox, 2017). It is believed that this could be due to people feeling afraid of the afterlife, and question whether they are "good enough" to go to what most people call Heaven.

A study that explored adolescents who belong to minority religions in Pakistan found that those who were in the minority (Hindus and Christians) had significantly lower self-esteem than adolescents who were Muslim (Iqbal, Ahmad & Ayub, 2012). This can possibly be attributed to the proposition that it is not only religion that in some cases improves self-esteem, but one's religion must also uplift their social status in order for religion to significantly contribute to mental health. A study that evaluated the impact on individuals who abandon religion found that religious people displayed significant subjective well-being compared to the non-religious, but only in the countries where religion was prevalent. On the other hand, countries where a person's religion was not prevalent showed no more subjective well-being than a non-religious individual (Diener, Tay & Myers, 2011). This aids the possibility that religion is only helpful when it gives an individual purpose, social support, respect and status in their societal conditions.

For my second hypothesis, I predicted that those who reported higher religiosity would report healthier heart rate variability and lower cortisol levels. Analysis revealed no significance between religiosity and heart rate mean or standard deviation normal to normal. But a negative significant correlation was found between the religiosity and high frequency. This is not what we hypothesized. Religious people having healthier hearts was assumed because of what the literature portrays. Krause, Ironson, & Hill (2016) studied religious commitment, volunteer work and resting pulse rates in over 2200 participants aging from 18 to over 65 (M=45.9). They found that those who were more involved in volunteer work reported healthier resting pulse rates.

Most of the literature on heart rate variability research that has to do with religion examined yoga practices and meditations, which I have cited in my literature review. In

those studies, most involved taking measures after asking individuals to participate in yoga (Vinay, Venkatesh & Ambarish, 2016) and (Nivethitha, Manjunath & Mooventhan, 2017). In comparison to my own study, I recorded a non-task involved, baseline measurement.

With regard to Cortisol, no significance was found between religiosity and cortisol levels. My hypothesis was founded on the expectation of a few studies. A study that evaluated spirituality and cortisol measures in breast cancer survivors found that higher spirituality was associated with healthier cortisol activity (Hulett, Armer, Leary, Stewart, McDaniel, Smit, Millspaugh & Millspaugh, 2018). Another study that evaluated religious-commitment signaling (behavior that shows a desire to engage with one's religious group) showed that those who had strong religious affiliations and membership displayed lower (healthier) cortisol levels (Lynn, Schell, Paris & Frye, 2015). A study that was conducted HIV-positive persons, and how their spirituality impacted depressive symptoms and cortisol. The researchers reported that higher spirituality was associated with lower cortisol levels (Carrico, Ironson, Antoni, Lechner, Duran, Kumar & Schneiderman, 2006).

In the current study, this hypothesis was not confirmed. A few potential reasons for why this might be the case is that most of the studies that were conducted took samples after a religious or spiritual task (worship service, yoga, etc.). The cortisol sample that I collected for this study was a one-time, baseline measure with no task preceding collection of the sample.

A study that examined physiological health of religious African-Americans found that religious males reported lower blood pressure while religious females reported higher blood pressure (Tartaro, Luecken and Gunn, 2005). We see here that males are more positively impacted by religion than females. A reason for this could very well be the

traditional role of women in religious organizations according to many cultures and religions around the world. Many religions, especially the major Abrahamic religions are considered patriarchal and explicitly call women to submission.

Most religious organizations do not allow for women to hold the positions of pastors, priests or any liturgical leadership position. This in turn can make women feel inferior in the eyes of their religion. Historians recognize that while religion has provided women with freedom at times, it has also been very oppressive (James, 1978). My sample was comprised of a female majority at 63%.

In my third hypothesis, I predicted that males who score higher in religiosity would score higher in self-esteem and life satisfaction. This hypothesis was partially confirmed. A regression analysis looking for the main effects of gender as a predictor found significance among males and females with regard to life satisfaction, but not self-esteem. A study that evaluated gender and self-esteem showed a small, yet significant difference between males and females. The researchers attribute this to men and women deriving their self-concept from different sources (Josephs, Markus & Tafarodi, 1992). Another study that examined gender and self-esteem with regard to emotion and stress found that females displayed higher stress for all measures given. They also found that males scored higher on self-esteem (Moksnes, Moljord, Espnes & Byrne, 2010). For life satisfaction, one study that examined this issue in the United Kingdom to see which gender was better off found that men and women typically have similar levels of life satisfaction.

They also took factors like income, childcare and health into consideration. This helped show what exactly contributes to life satisfaction for each gender, and still the levels were found to be very similar (Giusta, Jewell &Kambhampati, 2011). Another study that

examined gender, race, religiosity and psychological well-being. Researchers found that among men and women of white and African-American populations, African-American women who reported being religious reported that the highest life satisfaction (Gohler, Bhatta, Lekhak & Khana, 2016).

In my fourth hypothesis, I predicted that males who reported higher religiosity would display healthier heart rate variability and lower cortisol levels. This hypothesis was not confirmed. We found no significant correlations in measures of heart rate mean or standard deviation normal to normal, and found no significance for cortisol. We did however find a negative significant correlation between religion and high frequency. This goes against our hypothesis. But we did find significance testing for the main effects between religion and high frequency. We also found significance when testing for the main effects between gender and SDNN. Only a handful of studies have been conducted with regard to religion and cortisol levels, most were mentioned in the literature review. Most studies did not compare gender. Researchers in 2013 searched through literature on the MEDLINE database, looking for the keyword "resilience." Of the papers found, they searched for keywords "religion" and "cortisol" and found no results (Brewer-Smyth & Koenig, 2014). As the authors pointed out, this shows a crucial need for research for correlations between these two subjects. The reason for this could be that heart rate variability is only positive for religious people after they have performed a religious task, which we did not do in this study. We wanted to see if religion was beneficial for people on a general level without including any type of manipulation. But this method did not produce the results we hypothesized.

In conclusion, this study found no significance in religiosity being correlated with self-esteem, life satisfaction, cortiso, heart rate mean or SDNN. A significant negative correlation was found between religiosity and high frequency. This shows that religiosity in this sample may be detrimental to a religious person's cardiovascular health.

With respect to gender differences, analysis revealed no significance between males in females in self-esteem, cortisol levels, heart rate mean, standard deviation normal-to-normal or high frequency. A t-test and regression analysis both revealed significance in gender differences in life satisfaction. The impact of religion on cortisol and heart rate variability has not been widely studied. The current study gives some insight into the possibilities of religiosity's effects on human health.

Research Limitations

The limitations in this study had a lot to do with demographics. The majority of participants were female (63%). Most participants were also freshman in their undergraduate studies (51%). For race, a largely significant portion of the participants were white (71%). For religion, most participants reported being Protestant (57%). Also, due to an oversight, age was not asked in the demographic questionnaire. But it is safe to assume that most individuals were between the ages of 18-25 due to the fact that all participants were undergraduate or graduate students. There is also a limitation in the cortisol sampling method. We only collected a one-time, baseline measurement. Another limitation was not asking participants to perform any task before collecting heart rate variability data. The sample size (N=106) could also be larger. I acknowledge that this study only evaluates correlational data and does not imply causality.

Future Directions

Future research should consider a wider range of demographics with regard to gender and race. Researchers may also want to examine different age groups as this study only evaluated college students. Another thing researchers may want to do is to examine groups with a different religious identity other than Protestants (e.g., Catholics, Muslims, etc.). With regard to cortisol, future researchers may want to consider taking multiple cortisol samples as only one sample was taken in this current study. Lastly, researchers may consider asking participants to perform religious or spiritual tasks (prayer, meditation, etc.) before measuring heart rate variability.

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Appendices

Table 1
Descriptive Statistics for the Survey Questionnaires

Surveys	N	Minimum	Maximum	Mean	Std. Deviation
CRS	106	1.00	4.50	3.3	.79
SWLS	106	5.00	29.00	13.14	4.97
RSE	106	10.00	30.00	18.23	5.15
Cortisol	106	.04	2.42	.5162	.44877

Physiological Measures	N	Minimum	Maximum	Mean	Std. Deviation
HRMean	106	53.46	165.22	82.77	16.11
SDRRLOG	106	.00	236.00	60.56	44.47
HFLog	106	1.00	4.14	2.94	.619

Table 2

Pearson Correlation Analysis between the Centrality Religiosity Scale and Rosenberg Self-Esteem Scale, Satisfaction with Life Scale, Salivary Cortisol and measurements of Heart Rate Variability

Variables		HR	HF	SC	SDNN	RSE	SWLS	CRS
HR	Pearson Correlation	1	-.137	.037	.046	.098	.119	-.087
	Sig. (2-tailed)		.160	.710	.636	.319	.223	.373
	N		106	106	106	106	106	106
HF	Pearson Correlation		1	.034	.475*	-.055	-.082	-.309*
	Sig. (2-tailed)			.732	.000	.578	.404	.001
	N			106	106	106	106	106
SC	Pearson Correlation			1	-.037	.177	.129	-.081
	Sig. (2-tailed)				.703	.070	.187	.409
	N				106	106	106	106
SDNN	Pearson Correlation				1	-.150	-.079	.007
	Sig. (2-tailed)					.124	.424	.944
	N					106	106	106
RSE	Pearson Correlation					1	.509**	.009
	Sig. (2-tailed)						.000	.929
	N						106	106
SWLS	Pearson Correlation						1	-.116
	Sig. (2-tailed)							.236
	N							106
CRS	Pearson Correlation							1
	Sig. (2-tailed)							
	N							

Note. CRS= Centrality of Religiosity Scale. SWLS= Satisfaction with Life Scale. RSE= Rosenberg Self-Esteem. SC= Salivary Cortisol. HR = Heart Rate. HF= High Frequency. SDNN = The time-domain measure of the standard deviation of the normal- normal interval.

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-ta

Table 3
Independent Samples T-Test for All Measures

		N	Mean	Std. Deviation	Sig (2-tailed)
HRMean	Male	38	80.82	9.71	.378
	Female	68	83.81	18.75	
HFTPM	Male	38	2.92	.593	.841
	Female	68	2.95	.63	
Cortisol	Male	38	.5381	.4287	.709
	Female	68	.5039	.46225	
SDRR	Male	38	48.55	.30.79	.499
	Female	68	67.27	49.47	
RSE	Male	38	17.87	4.56	.595
	Female	68	17.6866	4.76798	
SWLS	Male	38	14.92	5.16	.008
	Female	68	12.15	4.61	
CRS	Male	38	3.23	.785	.466
	Female	68	3.35	.802	

Note. CRS= Centrality of Religiosity Scale. SWLS= Satisfaction with Life Scale. RSE= Rosenberg Self-Esteem. SC= Salivary Cortisol. HR = Heart Rate. HF= High Frequency. SDNN = The time-domain measure of the standard deviation of the normal- normal interval.
*. Correlation is significant at the 0.05 level (2-tailed).
**. Correlation is significant at the 0.01 level (2-tailed).

Table 4
Descriptive Statistics for Sex of Study Participants

Sex	Frequency	Percent	Valid Percent	Cumulative Percent
Male	39	36.8	36.8	36.8
Female	67	63.2	63.2	100.0
Total	106	100.0	100.0	

Table 5
Descriptive Statistics for Gender

	Frequency	Percent
Male	39	36.8
Female	67	63.2

Table 6
Descriptive Statistics for Race/Ethnicity of Study Participants

Race	Frequency	Percent	Valid Percent	Cumulative Percent
White	75	70.8	70.8	70.8
Asian	11	10.4	10.4	81.1
African-American	10	9.4	9.4	90.6
Hispanic	4	3.8	3.8	94.3
Biracial	3	2.8	2.8	97.2
Other	3	2.8	2.8	100.0
Total	106	100.0	100.0	

Table 7
Descriptive Statistics for Demographic Variables of Religious Identity

Religious Affiliation	Frequency	Percent	Valid Percent	Cumulative Percent
Protestant	60	56.6	56.6	56.6
Catholic	14	13.2	13.2	69.8
Jewish	1	.9	.9	70.8
Muslim	4	3.8	3.8	74.5
Spiritual	3	2.8	2.8	77.4
No Affiliation	12	11.3	11.3	88.7
Other	12	11.3	11.3	100.0
Total	106	100.0	100.0	

Table 8
Means and Standard Deviations of All Self-Report and Physiological Variables

Variables	M	SD
Religiosity	3.30	.795
Self-Esteem	18.23	5.15
Life Satisfaction	13.14	4.97
Salivary Cortisol	.5162	.448
Heart Rate Mean	82.77	16.11
High Frequency Log	2.94	.619
SDNN	60.56	44.47

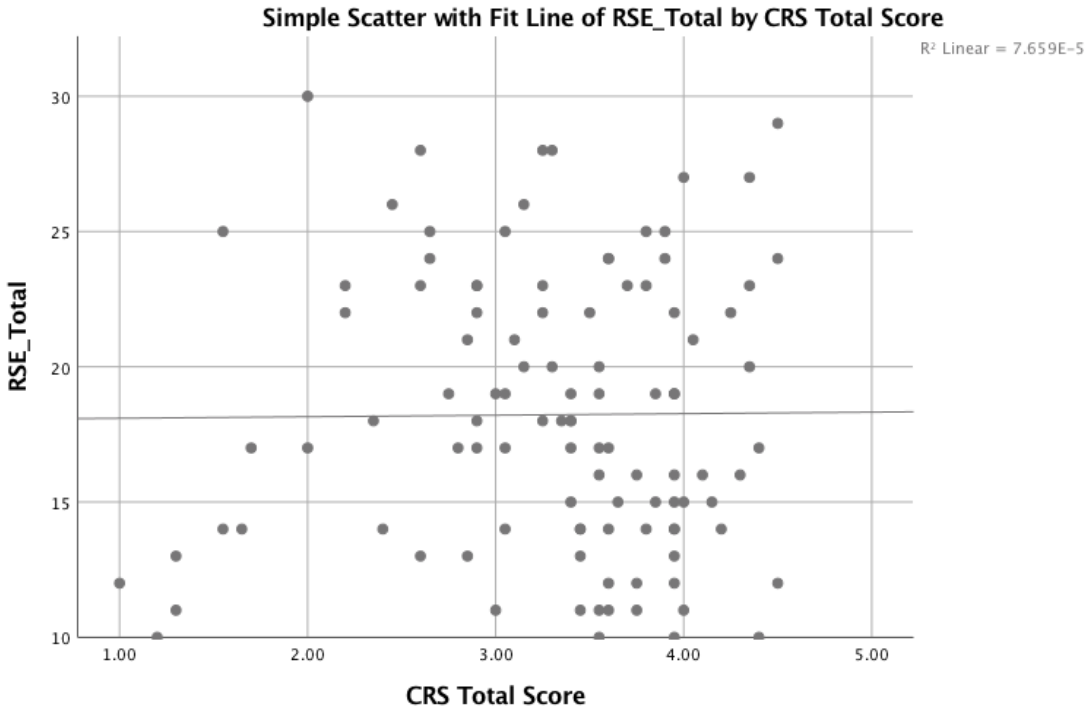

Figure 1
Scatter Plot Graph for Religiosity and Self-Esteem

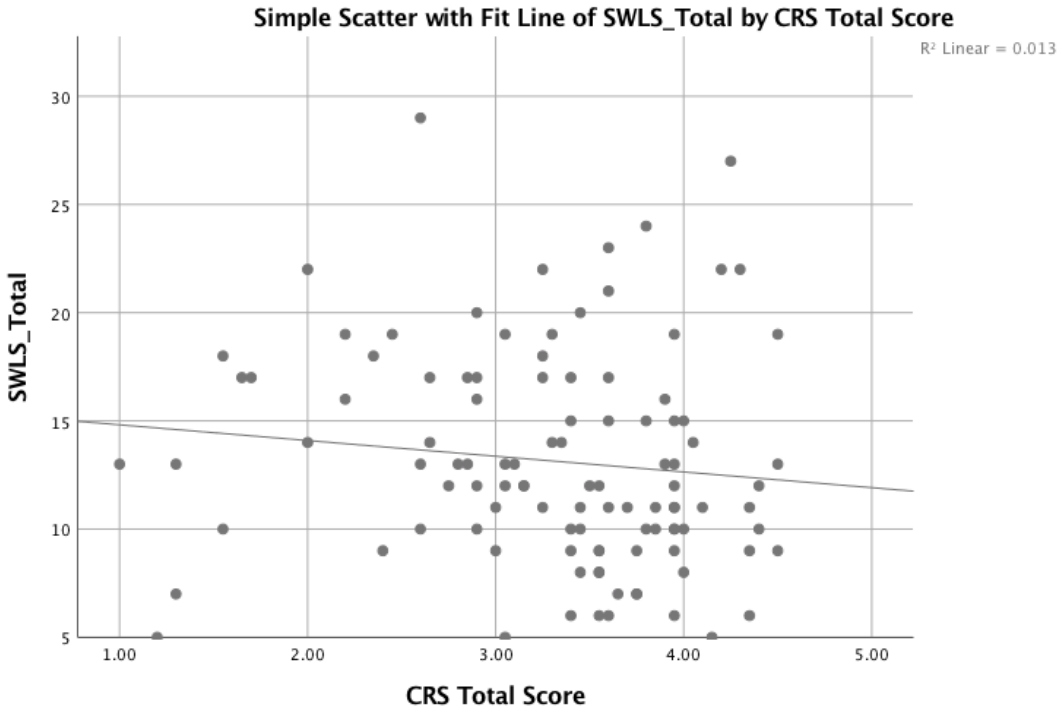

Figure 2
Scatter Plot Graph for Religiosity and Life Satisfaction

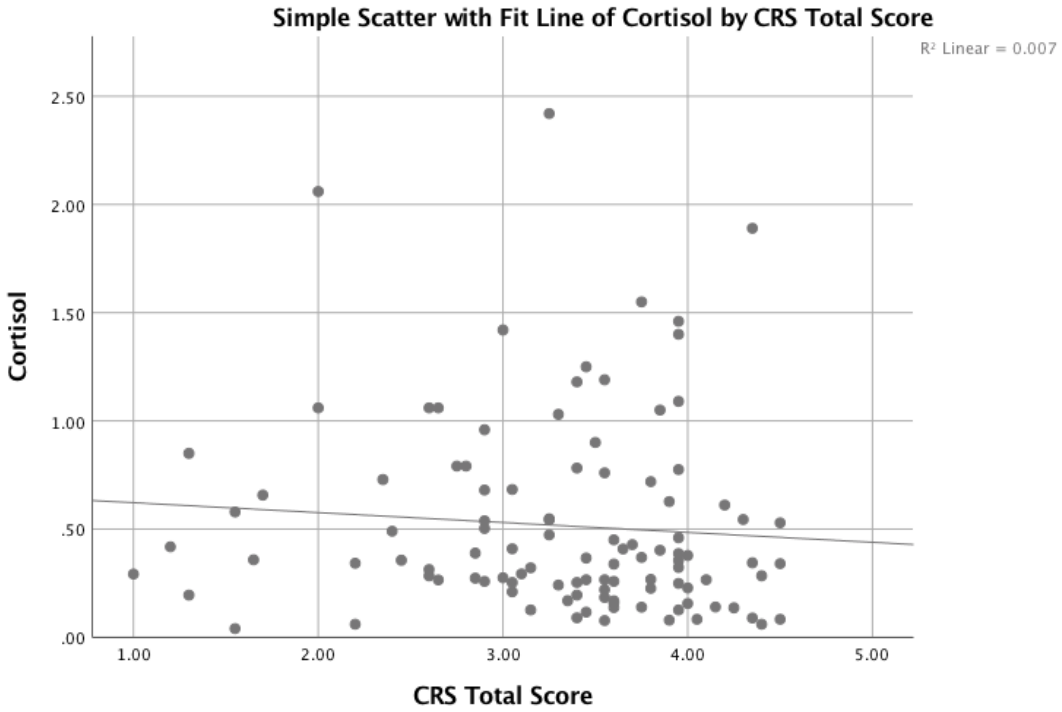

Figure 3
Scatter Plot Graph for Religiosity and Cortisol

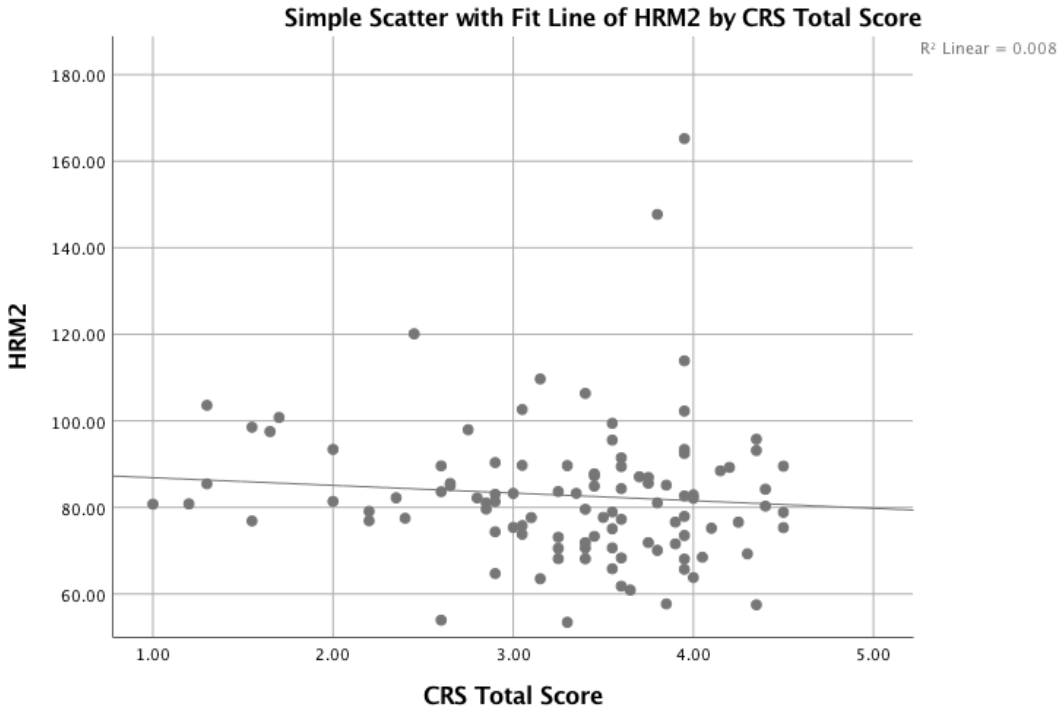

Figure 4
Scatter Plot Graph for Religiosity and Heart Rate Mean

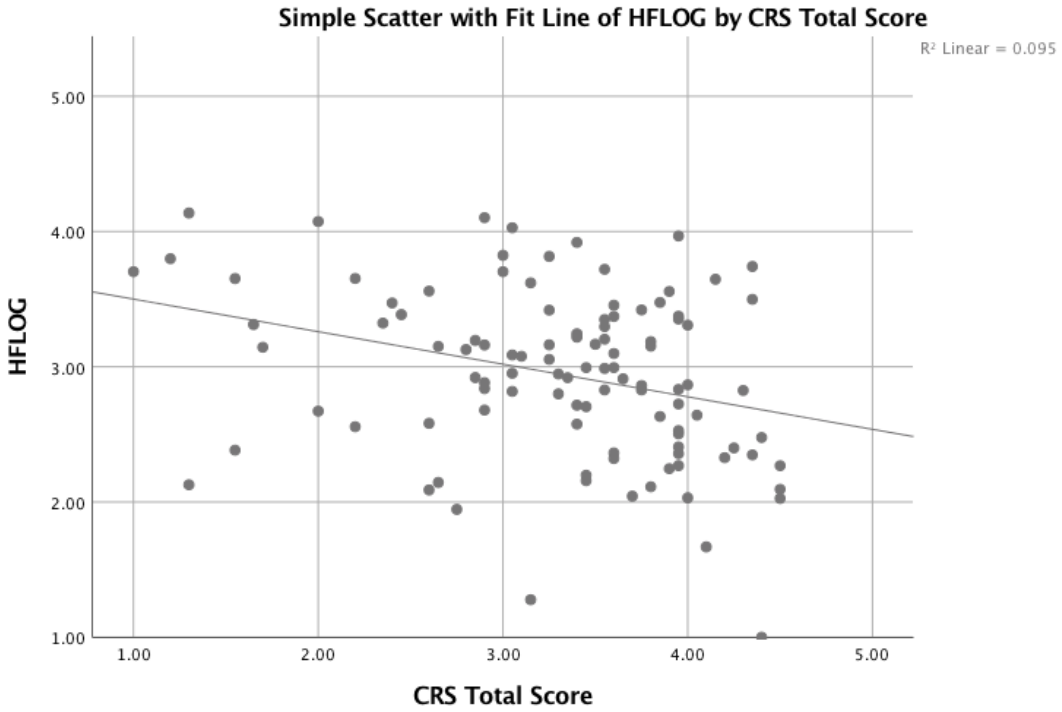

Figure 5
Scatter Plot Graph for Religiosity and High Frequency

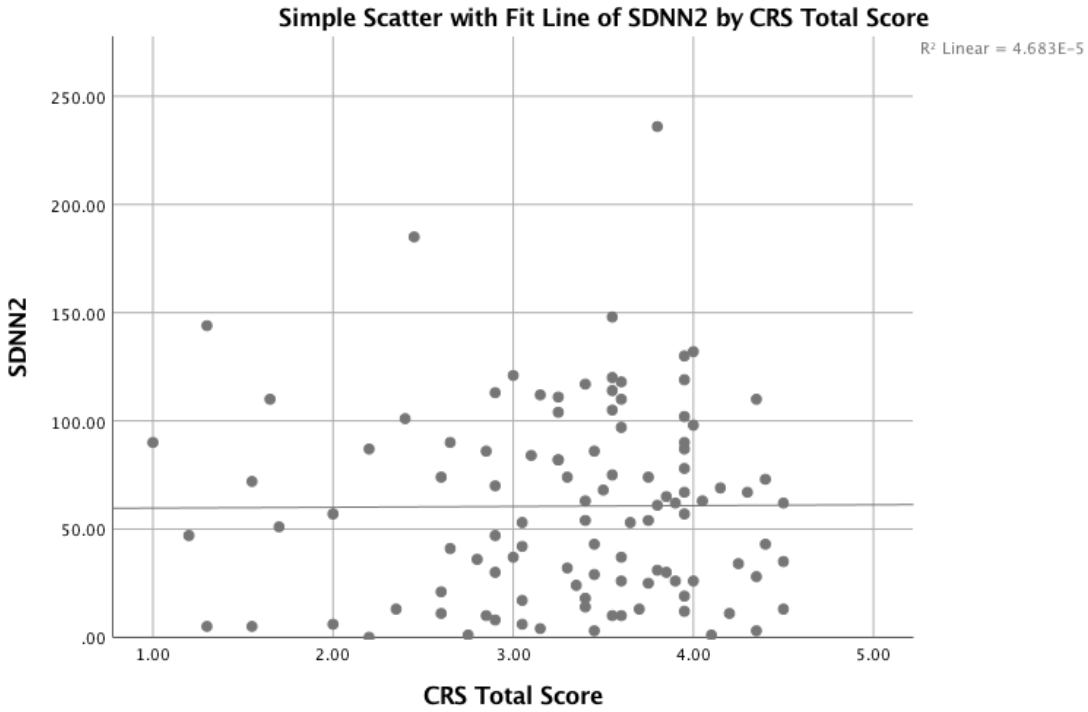

Figure 6
Scatter Plot Graph for Religiosity and SDNN

Informed Consent Form

Religiosity as a Moderator of Physiological Health, Self-Esteem and Life Satisfaction

Introduction: You are invited to participate in a research study designed to examine the relationship between religiosity and its impact on physiological and psychological health.

Participants' Involvement in the Study: You will be asked to complete 3 computerized questionnaires (religiosity, self-esteem and satisfaction with life). Once you complete the questionnaires, we will ask you to sit quietly while measures are taken examining your heart rate variability.

Next, we will ask you to rinse your with water prior to the collection of saliva. Then you will be asked to sit quietly and let the saliva pool in your mouth for one minute. At the end of the minute you will be asked to expectorate into a sanitized 50 ml test tube. You will repeat this procedure for 2 minutes. Your total participation time will be of 45 minutes.

Benefits: There is no direct benefit for your participation. However, this information will help us understand the relationship between components of religious or non-religious individuals and its impact on physical and mental health.

Risks: There is minimal risk associated with this study. Most research involves some risk to breach of confidentiality and it is possible that someone could either find out you were in this study or see your study information. Although this risk is possible, the investigators will make every effort to minimize these risks and to protect participants.

We may stop the test at any time. It is important for you to realize that you may stop when you wish because of feelings of fatigue or any discomfort. Please let the study investigators know immediately so that you can be assisted.

Participation: Your participation is strictly voluntary and you may decline to participate without penalty. Additionally, you can stop and/or withdraw from this study at any time. If you withdraw from the study before data collection is complete, your data will be destroyed and eliminated from analyses.

Compensation: You will receive 2 SONA credits upon full participation. Any form of partial participation (i.e. stopping the submaximal testing) will result in 1 SONA credit for completion.

Confidentiality: The information you provide is strictly confidential. No names or other identifying items will be present on any of the surveys or data analyses. Your data will be used solely for this study. Only the Principal Investigator (Fadi E. Hakeem) and faculty advisors (Drs. Debora R. Baldwin, Subimal Datta and Michael Olson) will have access to

this data. All data will be kept on a password protected computer and stored in a locked file cabinet in the Ken and Blaire Mossman Building. No reference will be made in oral or written reports which could link you to this study.

IRB NUMBER: UTK IRB-18-04633-XP
IRB APPROVAL DATE: 09/17/2018
IRB EXPIRATION DATE: 09/16/2019

Contact Information: Fadi E. Hakeem can be contacted at fhakeem@vols.utk.edu or (615) 481-7602. Dr. Debora R. Baldwin's contact information is dbaldwin@utk.edu or (865) 974-3357. Dr. Subimal Datta can be contacted at sdatta1@utk.edu. Dr. Michael Olson can be contacted at molson2@utk.edu. In addition, if you have any questions about your rights as a participant, you may contact the University of Tennessee IRB Compliance Officer at utkirb@utk.edu or (865) 974-7697.

CONSENT

I have read the above information. I have received a copy of this form. I agree to participate in this study.

Participant's Name (printed) _____

Participant's Signature _____ Date _____

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Centrality of Religiosity Scale

How often do you think about religious issues?

1. Very Often
2. Often
3. Occasionally
4. Rarely
5. Never

2.To what extent do you believe that Gods, deities, or something divine exists?

1. Very Much So
2. Quite a Bit
3. Moderately
4. Not Very Much
5. Not at All

3. How often do you take part in religious services?

1. Several Times a Day
2. Once a Day
3. More than once a week
4. One to three time a month
5. A few times a year
6. Less than a few times a year
7. Never

4. How often do you pray?

1. Several Times a Day
2. Once a Day
3. More than once a week
4. One to three time a month
5. A few times a year
6. Less than a few times a year
7. Never

4b. How often do you meditate?

1. Several Times a Day
2. Once a Day
3. More than once a week
4. One to three time a month

5. A few times a year
6. Less than a few times a year
7. Never

5. How often do you experience situations in which you have the feeling that God or something divine intervenes in your life?

1.Several Times a Day
2.Once a Day
3.More than once a week
4.One to three time a month
5.A few times a year
6.Less than a few times a year

5b. How often do you experience situations in which you have the feeling that you are in one with all?

1. Very Often
2. Often
3. Occasionally
4. Rarely
5. Never

6. How interested are you in learning more about religious topics?

1. Very Much So
2. Quite a Bit
3. Moderately
4. Not Very Much
5. Not at All

7. To what extend do you believe in an afterlife—e.g. immortality of the soul, resurrection of the dead or reincarnation?

1. Very Much So
2. Quite a Bit
3. Moderately
4. Not Very Much
5. Not at All

8. How important is it for you to take part in religious services?

1. Extremely Important
2. Very Important
3. Moderately Important

4. Slightly Important
5. Not at all important

9. How important is personal prayer for you?

1. Extremely Important
2. Very Important
3. Moderately Important
4. Slightly Important
5. Not at all important

9b. How important is meditation for you?

1. Extremely Important
2. Very Important
3. Moderately Important
4. Slightly Important
5. Not at all important

10. How often do you experience situations in which you have the feeling that God, deities, or something divine wants to communicate or to reveal something to you?

1. Very Often
2. Often
3. Occasionally
4. Rarely
5. Never

10b. How often do you experience situations in which you have the feeling that you are touched by a divine power?

6. Very Often
7. Often
8. Occasionally
9. Rarely
10. Never

11. How often do you keep yourself informed about religious questions through radio, television, internet, newspapers, or books?

1. Very Often
2. Often
3. Occasionally
4. Rarely
5. Never

12. In your opinion, how probable is it that a higher power really exists?

1. Very Much So
2. Quite a Bit
3. Moderately
4. Not Very Much
5. Not at All

13. How important is it for you to be connected to a religious community?

1. Extremely Important
2. Very Important
3. Moderately Important
4. Slightly Important
5. Not at all important

14. How often do you pray spontaneously when inspired by daily situations?

1. Very Often
2. Often
3. Occasionally
4. Rarely
5. Never

14b. How often do you try to connect to the divine spontaneously when inspired by daily situations?

1. Very Often
2. Often
3. Occasionally
4. Rarely
5. Never

15. How often do you experience situations in which you have the feeling that God, deities, or something divine is present?

1. Very Often
2. Often
3. Occasionally
4. Rarely
5. Never

Rosenberg Self-Esteem Scale

1.	On the whole, I am satisfied with myself.	SA	A	D	SD
2.*	At times, I think I am no good at all.	SA	A	D	SD
3.	I feel that I have a number of good qualities.	SA	A	D	SD
4.	I am able to do things as well as most other people.	SA	A	D	SD
5.*	I feel I do not have much to be proud of.	SA	A	D	SD
6.*	I certainly feel useless at times.	SA	A	D	SD
7.	I feel that I'm a person of worth, at least on an equal plane with others.	SA	A	D	SD
8.*	I wish I could have more respect for myself.	SA	A	D	SD
9.*	All in all, I am inclined to feel that I am a failure.	SA	A	D	SD
10.	I take a positive attitude toward myself.	SA	A	D	SD

Satisfaction with Life Scale

Instructions: Below are five statements that you may agree or disagree with. Using the 1 - 7 scale below, indicate your agreement with each item by placing the appropriate number on the line preceding that item. Please be open and honest in your responding.

- 7 - Strongly agree
- 6 - Agree
- 5 - Slightly agree
- 4 - Neither agree nor disagree
- 3 - Slightly disagree
- 2 - Disagree
- 1 - Strongly disagree

____ In most ways my life is close to my ideal

. ____ The conditions of my life are excellent.

____ I am satisfied with my life.

____ So far I have gotten the important things I want in life.

____ If I could live my life over, I would change almost nothing.

Vita

Fadi Hakeem was born in Alexandria, Egypt. At a young age, he moved with his family to the United States, settling in Nashville, TN. He attended McGavock High School. After graduating, he moved to Murfreesboro, TN and attended Middle Tennessee State University. There he earned a bachelor of science. After gaining zeal for psychology during his undergraduate studies, he applied for graduate school. He accepted a graduate teaching assistantship at the University of Tennessee, Knoxville, in the Experimental Psychology program with a concentration in biological psychology. He will be graduating on May 9, 2019.